

401 KAR 59:050. New storage vessels for petroleum liquids.

NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
Department for Environmental Protection
Division for Air Quality

Relates to: KRS Chapter 224

Pursuant to: KRS 13.082, 224.033

Necessity and Function: KRS 224.033 requires the Department for Natural Resources and Environmental Protection to prescribe regulations for the prevention, abatement, and control of air pollution. This regulation provides for the control of emissions from new storage vessels for petroleum liquids.

Section 1. Applicability.

- (1) The provisions of this regulation shall apply to each affected facility with a storage capacity less than or equal to 151,400 liters (40,000 gallons) commenced on or after the classification date defined in Section 2(12), which is located:
 - (a) In an urban county designated non-attainment for ozone under 401 KAR 51:010; or
 - (b) In any other county and is a part of a major source of volatile organic compounds.
- (2) The provisions of this regulation shall apply to each affected facility with a storage capacity greater than 151,400 l (40,000 gallons) commenced on or after the classification date defined in Section 2(12).
- (3) The provisions of Section 3(3) and (4), 4(3) and 6 shall apply only to each affected facility with a storage capacity greater than 151,400 liters (40,000 gallons) commenced on or after May 19, 1978.

Section 2. Definitions.

As used in this regulation, all terms not defined herein shall have the meaning given them in 401 KAR 50:010.

- (1) "Affected facility" means a storage vessel for petroleum liquids which has a storage capacity of greater than 2,195 l (580 gallons).
- (2) "Storage vessel" means each tank, reservoir, or container used for the storage of petroleum liquids, but does not include:
 - (a) Pressure vessels which are designed to operate in excess of 204.9 kPa (fifteen (15) pounds per square inch gauge) without emissions to the atmosphere except under emergency conditions;
 - (b) subsurface caverns or porous rock reservoirs; or
 - (c) Underground tanks if the total volume of petroleum liquids added to and taken from a tank annually does not exceed twice the volume of the tank.
- (3) "Petroleum liquids" means petroleum, condensate, and any finished or intermediate products manufactured in a petroleum refinery but does not mean Number 2 through Number 6 fuel oils, turbine fuel oil Numbers 2-GT through 4-GT, or diesel fuel oils Numbers 2-D and 4-D as specified by the department.
- (4) "Petroleum refinery" means each facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, or other products through distillation of petroleum or through redistillation, cracking, or reforming of unfinished petroleum derivatives.

- (5) "Petroleum" means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.
- (6) "Condensate" means hydrocarbon liquid separated from natural gas which condenses due to changes in the temperature and/or pressure and remains liquid at standard conditions.
- (7) "True vapor pressure" means the equilibrium partial pressure exerted by a petroleum liquid as determined in accordance with methods specified by the department.
- (8) "Floating roof" means a storage vessel cover consisting of a double deck, pontoon single deck, internal floating cover or covered floating roof, which rests upon and is supported by the petroleum liquid being contained and is equipped with a closure seal or seals to close the space between the roof edge and tank wall.
- (9) "Vapor recovery system" means a vapor gathering system capable of collecting all hydrocarbon vapors and gases discharged from the storage vessel and a vapor disposal system capable of processing such hydrocarbon vapors and gases so as to prevent their emission to the atmosphere.
- (10) "Reid vapor pressure" is the absolute vapor pressure of volatile crude oil and volatile petroleum liquids, except liquefied petroleum gases, as determined by methods specified by the department.
- (11) "Submerged fill pipe" means any fill pipe the discharge of which is entirely submerged when the liquid level is six (6) inches above the bottom of the tank; or when applied to a tank which is loaded from the side, shall mean every fill pipe the discharge opening of which is entirely submerged when the liquid level is two (2) times the fill pipe diameter above the bottom of the tank.
- (12) "Classification date" means April 9, 1972.
- (13) "Volatile organic compounds (VOC)" means chemical compounds of carbon (excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, and ammonium carbonate) which have a vapor pressure greater than one-tenth (0.1) mm Hg at conditions of twenty (20) degrees Celsius and 760 mm Hg.
- (14) "Custody transfer" means the transfer of produced petroleum and/or condensate, after processing and/or treating in the producing operations, from storage tanks or automatic transfer facilities to pipelines or any other forms of transportations.
- (15) "External floating roof" means a storage vessel cover in an open top tank consisting of a double deck or pontoon single deck which rests upon and is supported by the petroleum liquid being contained and is equipped with closure seals to close the space between the roof edge and tank shell.
- (16) "Internal floating roof" means a cover or roof in a fixed roof tank which rests upon or is floated upon the petroleum liquid being contained, and is equipped with closure seals to close the space between the roof edge and tank shell.
- (17) "Liquid-mounted seal" means a foam or liquid-filled primary seal mounted in contact with the liquid between the tank wall and the floating roof continuously around the circumference of the tank.

- (18) "Vapor-mounted seal" means a foam-filled primary seal mounted continuously around the circumference of the tank so there is an annular vapor space underneath the seal. The annular vapor space is bounded by the bottom of the primary seal, the tank wall, the liquid surface, and the floating roof.
- (19) "Metallic shoe seal" includes but is not limited to a metal sheet held vertically against the tank wall by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.
- (20) "kPa" means kilopascal.

Section 3. Standard for Volatile Organic Compounds.

- (1) The owner or operator of any storage vessel commenced on or after April 9, 1972 and prior to May 19, 1978 to which this regulation applies shall store petroleum liquids as follows:
- (a) If the storage vessel has a storage capacity greater than 151,400 l (40,000 gallons) and if the true vapor pressure of the petroleum liquid, as stored, is equal to or greater than seventy-eight (78) mm Hg (1.5 psia) but not greater than 574 mm Hg (11.1 psia) the storage vessel shall be equipped with a floating roof, a vapor recovery system, or their equivalents. If the vessel is equipped with an external floating roof the vessel shall be retrofitted and operated according to the provisions of 401 KAR 61:050, Sections 3(4), 4(3), 6(2) and 7 if the vessel is located:
1. In a urban county designated non-attainment for ozone under 401 KAR 51:010; or
 2. In any other county which is designated non-attainment or unclassified for ozone under 401 KAR 51:010 and is a part of a major source of volatile organic compounds.
 3. The provisions of 401 KAR 61:050 Sections 3(4) and 4(3) shall not apply to vessels located in the following counties: Garrard, Graves, Hopkins, Laurel, Montgomery, Nelson, Pulaski, Scott, Taylor, Trigg, and Union prior to designation of such counties non-attainment for ozone under 401 KAR 51:010.
- (b) If the storage vessel has a storage capacity greater than 151,400 l (40,000 gallons) and if the true vapor pressure of the petroleum liquid as stored is greater than 574 mm Hg (11.1 psia), the storage vessel shall be equipped with a vapor recovery system or its equivalent.
- (2) The owner or operator of each storage vessel commenced on or after April 9, 1972 to which this regulation applies shall store petroleum liquids as follows: If the storage vessel has a storage capacity greater than 2,195 (580 gallons), and if the true vapor pressure of the petroleum liquid, as stored, is equal to or greater than 10.3 kPa (1.5 psia), as a minimum it shall be equipped with a permanent submerged fill pipe.
- (3) The owner or operator of each storage vessel commenced on or after May 19, 1978, with storage capacity greater than 151,400 l (40,000 gallons) which contains a petroleum liquid which, as stored, has a true vapor pressure equal to or greater than 10.3 kPa (1.5 psia) but not greater than 76.6 kPa (11.1 psia) shall equip the storage vessel with one (1) of the following:
- (a) An external floating roof, consisting of a pontoon-type or

double-deck-type cover that rests on the surface of the liquid contents and is equipped with a closure device between the tank wall and the roof edge. Except as provided in subparagraph 3. of this paragraph, the closure device is to consist of two (2) seals, one (1) above the other. The lower seal is referred to as the primary seal and the upper seal is referred to as the secondary seal. Each seal is to meet the following requirements:

1. The primary seal is to be either a metallic shoe seal, a liquid-mounted seal, or a vapor-mounted seal.
 2. The secondary seal is to be installed above the primary seal so that it completely covers the space between the roof edge and the tank wall except as provided in Section 4(3)(c).
 3. The owner or operator is exempted from the requirements for secondary seals and the secondary seal gap criteria when performing gap measurements or inspections of the primary seal.
- (b) A fixed roof with an internal floating type cover equipped with a continuous closure device between the tank wall and the cover edge.
- (c) A vapor recovery system which collects all VOC vapors and gases discharged from the storage vessel, and a vapor return or disposal system which is designed to process such VOC vapors and gases so as to reduce their emission to the atmosphere by at least ninety-five (95) percent weight.
- (d) A system equivalent to those described in paragraphs (a) to (c) of this subsection as determined by the department.
- (4) The owner or operator of each storage vessel commenced on or after May 19, 1978 with a storage capacity greater than 151,400 l (40,000 gallons) which contains a petroleum liquid which, as stored, has a true vapor pressure greater than 76.6 kPa (11.1 psia), shall equip the storage vessel with a vapor recovery system which collects all VOC vapors and gases discharged from the storage vessel, and a vapor return or disposal system which is designed to process such VOC vapors and gases so as to reduce their emission to the atmosphere by at least ninety-five (95) percent by weight.

Section 4. Operating Requirements.

- (1) There shall be no visible holes, tears, or other openings in the seal, any seal fabric, shoe, or seal envelope.
- (2) All openings, except stub drains, automatic bleeder vents, rim space vents, and leg sleeves, shall be equipped with covers, lids, or seals such that:
- (a) The cover, lid, or seal in the closed position at all times (i.e. no visible gap) except when in actual use or as described in subsection (3)(f) of this section;
 - (b) Automatic bleeder vents are closed at all times except when the roof is floated off or landed on the roof leg supports; and
 - (c) Rim vents, if provided, are set to open when the roof is being floated off the roof leg supports or at the manufacturer's recommended setting.
- (3) External and internal floating roof tanks commenced on or after May 19,

1978 shall meet the additional requirements:

- (a) The roof is to be floating on the liquid at all times (i.e., off the roof leg supports) except during initial fill and when the tank is completely emptied and subsequently refilled. The process of emptying and refilling when the roof is resting on the leg supports shall be continuous and shall be accomplished in the minimum time necessary.
- (b) For each primary seal associated with an external floating roof tank the accumulated area of gaps between the tank wall and the metallic shoe seal or the liquid-mounted seal shall not exceed 212 sq. cm/m (10.0 sq. in/ft) of tank diameter and the width of any portion of any gap shall not exceed 3.81 cm (1.5 in).
- (c) For each primary and secondary seal associated with an external floating roof tank the accumulated area of gaps between the tank wall and the vapor-mounted seal or between the tank wall and the secondary seal shall not exceed 21.2 sq. cm/m (1.0 sq. in/ft) of tank diameter and the width of any portion of any gap shall not exceed 1.27 cm (one-half(1/2) in).
- (d) One (1) end of the metallic shoe associated with an external floating roof tank shall extend into the stored liquid and the other end shall extend a minimum vertical distance of sixty-one (61) cm (twenty-four(24) in) above the stored liquid surface.
- (e) Each opening in the roof except for automatic bleeder vents and rim space vents is to provide a projection below the liquid surface.
- (f) Each emergency roof drain associated with an external floating roof tank is to be provided with a slotted membrane fabric cover that covers at least ninety (90) percent of the area of the opening.

Section 5. Monitoring of operations.

- (1) The owner or operator of any storage vessel with a capacity of greater than 151,400 liters (40,000 gallons) to which this regulation applies shall maintain a record of the petroleum liquid stored, the period of storage, and the maximum true vapor pressure of that liquid during the respective storage period.
- (2) Available data on the typical Reid vapor pressure and the maximum expected storage temperatures of the stored product may be used to determine the maximum true vapor pressure as specified by the department, unless the department specifically requests that the liquid be sampled, the actual storage temperature determined, and the Reid vapor pressure determined from the sample(s).
- (3) The true vapor pressure of each type of crude oil with a Reid vapor pressure less than 13.8 kPa (2.0 psia) or whose physical properties preclude determination by the recommended method is to be determined from available data and recorded if the estimated true vapor pressure is greater than 6.9 kPa (1.0 psia).
- (4) The following are exempt from the requirements of this section:
 - (a) The owner or operator of each storage vessel storing a petroleum liquid with a Reid vapor pressure of less than 6.9 kPa (1.0 psia) provided the maximum true vapor pressure does not exceed 6.9 kPa (1.0 psia).

- (b) Each owner or operator of each storage vessel equipped with a vapor recovery and return or disposal system in accordance with the requirements of Section (1)(a) and (b), (3)(c) and (4).

Section 6. Testing and procedures.

Compliance with the requirements prescribed in Sections 3(3) and (4), and 4(3) shall be determined as follows or in accordance with an equivalent procedure as approved by the department. The owner or operator of each storage vessel to which this section applies which has an external floating roof shall meet the following requirements:

- (1) Determine the gap areas and maximum gap widths between the primary seal and the tank wall, and the secondary seal and the tank wall according to the following frequency and furnish the department with a written report of the results within sixty (60) days of performance of gap measurements:
 - (a) For primary seals, gap measurements shall be performed within sixty (60) days of the initial fill with petroleum liquid and at least once every year thereafter.
 - (b) For secondary seals, gap measurements shall be performed within sixty (60) days of the initial fill with petroleum liquid and at least once every year thereafter.
 - (c) If any storage vessel is out of service for a period of one (1) year or more, subsequent refilling with petroleum liquid shall be considered initial fill for the purposes of paragraphs (a) and (b) of this subsection.
- (2) Determine gap widths in the primary and secondary seals individually by the following procedures:
 - (a) Measure seal gaps, if any, at one (1) or more floating roof levels when the roof is floating off the roof leg supports.
 - (b) Measure seal gaps around the entire circumference of the tank in each place where a one-eighth (1/8) inch diameter uniform probe passes freely (without forcing or binding against seal) between the seal and the tank wall and the measure the circumferential distance of each such location.
 - (c) The total surface area of each gap described in paragraph (b) of this subsection shall be determined by using probes of various widths to accurately measure the actual distance from the tank wall to the seal and multiplying each such width by its respective circumferential distance.
- (3) Add the gap surface area of each gap location for the primary seal and the secondary seal individually. Divide the sum for each seal by the nominal diameter of the tank and compare each ratio to the appropriate ratio in the standard in Section 4(3)(b) and (c).
- (4) Provide the department thirty (30) days prior notice of the gap measurement to afford the opportunity to have an observer present.

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